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Memorandum

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Subject	**Town of Orleans, MA** **Water Quality and Wastewater Planning** **Task Number 4.f.6 – Adaptive Management Plan – Draft Technical Memorandum for Stormwater and Fertilizer Monitoring**
Project Number	60476644
From	Thomas Parece, P.E., AECOM Project Manager
Date	05/16/16

1. Background

a. Purpose of Technical Memorandum (TM)

The Town of Orleans has taken a proactive approach to implementing stormwater and fertilizer management for water resources protection. Two separate consultants are currently providing evaluations related to stormwater and fertilizer, including GHD, Inc., and AMEC Foster Wheeler. In addition, Orleans submitted a NPDES Phase II Small MS4 General Permit Annual Report to the Environmental Protection Agency in April 2016, included as Appendix A. The purpose of this Technical Memorandum is to summarize and present results from these studies that are relevant to the town's Adaptive Management Plan.

2. Description of Stormwater Programs

a. Outfall Evaluations

In 2013, GHD, Inc. prepared a detailed report on stormwater outfalls in Orleans entitled *Orleans Town-Wide Preliminary Stormwater Assessment* (Appendix B).
This report contains the following sections:

- Fact Sheet for public education and outreach regarding stormwater issues;
- Conceptual Cost Estimate Memorandum that provide an "order of magnitude" cost for addressing the 98 stormwater outfalls identified as part of the preliminary stormwater assessment;

- Stormwater Mitigation Team Presentations that provide details on the project scope, Massachusetts Estuaries Project (MEP) stormwater nitrogen assumptions and loadings, technologies for stormwater nitrogen removal, and the finding of the outfall evaluations (e.g., contributing areas, site visit findings, base calculations and data sources). A possible approach for prioritizing stormwater planning efforts as well as a revised Town Drainage Code is also described;

- Sampling Plan that summarizes existing stormwater sampling data and details a plan for future stormwater sampling;

- Outfall Worksheets that describe the drainage area and existing conditions for 98 stormwater outfalls, including photo documentation;

- Outfall Location Map for all areas affected by Massachusetts List of Impaired Waters (303d) listings. Map is also provided in a GIS format; and

- Outfall Prioritization Spreadsheets including a matrix of categories and a set of rules for a ranking system, as well as three outfall prioritization tables based on three different considerations.

    - Prioritization based on Public Benefit;

    - Prioritization based on Phosphorous Sensitivity; and

    - Prioritization based on Watershed Nitrogen Sensitivity.

Appendix C includes a spreadsheet with the preliminary classification of the stormwater systems in Orleans that was developed as part of the 2013 Orleans Town-Wide Preliminary Stormwater Assessment.

In March 2016, GHD, Inc. was contracted to complete the following Scope of Services as a continuation of the preliminary assessment effort that was completed in 2013. The following tasks are scheduled to be completed in the fall of 2016.

- Classify 35 stormwater systems by type of Best Management Practice (BMP), such as leaching basin, infiltration, bio-filter and constructed wetland;

- Perform a field review of each BMP including visual observation of exterior and interior components (if applicable). Field inspection will include visual review of structural condition (if any visual stresses are shown), review of infiltration pores to determine functionality (if applicable), review of surface material and profile to determine functionality, and review of current status of surface ground conditions. Surface treatment systems will also be reviewed for vegetative health and condition of plantings. Any irregularities observed in the BMPs will be documented;

- Provide an Operation and Maintenance (O&M) guidance document for each type of stormwater BMP that is classified including a recommendation for the frequency of the maintenance schedule for each of the 35 BMPs; and

- Create an inventory spreadsheet of installed BMPs to include system type, installation date (if known), maintenance requirements and other relevant attributes.

b. AMEC Stormwater Projects

In 2014 AMEC Foster Wheeler was contract to perform a stormwater and nutrient management analysis. The purpose of this project is to evaluate stormwater management town-wide, conduct an initial analysis of pollutant loads, identify current and future mitigation practices and define a cost-effective strategy to meet town water quality improvement goals. A key deliverable of this project is a comprehensive GIS database layer that can be updated with new information over time to refine and update the town's stormwater management program. This project began in 2014 and is expected to be completed by the end of 2016. The main tasks included in this project are data collection, baseline mapping, calculating current baseline stormwater nutrient and pathogen loads, defining a set of stormwater BMPs to meet the town's goals for reducing stormwater pollution (both nutrients and pathogens) and evaluating this program in terms of dollars per pound of nutrients or counts of pathogens remediated.

The result of the data collection and baseline mapping tasks will be a GIS layer that represents baseline pollutant loads from stormwater runoff that is input to using a stormwater analysis tool entitled AMEC Load Estimation and Reduction Tracking (ALERT). This GIS layer is being assembled by consolidating GIS layers and associated data from a variety of sources, including MassGIS and work of other consultants for Orleans as well as incorporating outfall drainage area and water quality data.

In order to evaluate the potential for BMPs to reduce stormwater pollution, a separate GIS layer is being assembled that includes the suite of stormwater BMPs that are currently installed as well as conceptual BMPs developed as part of the Orleans Town-Wide Preliminary Stormwater Assessment. This GIS layer will include the calculated load reductions attributable to these BMPs. New potential BMPs will also be identified as part of this task and information on groundwater flow patterns will be reviewed as it relates to selection of appropriate BMPs. Once the specific mix of new and existing BMPs is defined, the ALERT tool will be used to evaluate several aspects of the overall stormwater management plan for Orleans, including:

- Pollutant reduction achieved by the specific mix of BMPs;
- Additional acres of catchment area to be treated to meet nutrient and pathogen reduction goals; and
- Total costs (installation and O&M) associated with this program

A Technical Memorandum will be produced by the end of 2016 that documents this stormwater plan, and includes a description of the methodology used to define this plan, including the ALERT tool.

c. NPDES Phase II Small MS4 General Permit Annual Report

This annual report states that the town is continuing to evaluate program needs based on the draft 2014 Phase II Permit and using these evaluations and other activities (e.g., Comprehensive Wastewater Management Plan and BMP projects) to continue developing a Stormwater Management Plan (SWMP). The following key stormwater management planning activities were listed in this annual report:

- Detailed mapping of the downtown area was conducted SMC Engineering, Inc. to identify all municipal infrastructure with an emphasis on drainage and other utilities. This effort was coordinated with Greenseal Environmental, Inc. to complete the mapping of drainage systems through the remainder of the Town. The result of these efforts will be a field verified drainage map that identifies each structure, pipe and existing stormwater BMP. The mapping effort is substantially complete and will be finalized in the summer of 2016.

- As part of the 208 Plan Update for Cape Cod, the Town is required to establish watershed management teams. The Town began evaluating teams for specific waters to meet the requirements of the 208 Plan approval. The results of the above efforts are being incorporated into a stormwater pollutant load analysis and dynamic planning tool by Amec Foster Wheeler and will provide the following information: baseline stormwater pollutant loads; analysis of existing stormwater BMPs and benefits; prioritization of stormwater management basins (watersheds); and an evaluation of proposed BMPs, benefits and costs. This effort is anticipated to be completed by the fall of 2016. This information will be used as the basis for future capital projects to design and install stormwater BMPs for water quality improvement.

- There were several stormwater and water quality improvement projects designed:

    - Eldridge Playground Improvement Project – tree plantings and improvements were completed in April 2016 to infiltrate stormwater from the tennis courts;

    - Rock Harbor Dredging – completed in spring 2015;

    - Rock Harbor Parking Lot – stormwater improvement BMPs were designed and construction will be completed in early 2017;

    - Portanimicut Road – design began for stormwater improvements (infiltration and erosion control) to be constructed in 2016;

    - Gibson Road – outfall improvements (infiltration) are under design for the direct discharge to Town Cove;

    - BMP Database – the Town began efforts to complete a comprehensive assessment of all stormwater BMPs (approx. 35) in Town to develop an operation and maintenance plan. This effort is anticipated to be completed by fall 2016;

    - Water Quality Monitoring – ongoing water quality monitoring was conducted throughout Year 13 at the creeks that enter Cape Cod Bay, Pleasant Bay (21 locations), and Nauset Bay (3 locations). The Town also increased funding for 2016 to include additional monitoring locations in Nauset Bay to support the Massachusetts Estuary Program (MEP) update; and

    - Rock Harbor Road – design began for multiple locations to provide stormwater treatment (infiltration) for direct outfalls.

The above efforts are reviewed on an ongoing basis by the Stormwater Team, which consists of the DPW and Natural Resources Director, DPW Manager, Town Planner, Health Agent, Conservation Officer and the Chairperson of the Marine and Freshwater Quality Task Force.

3. Description of Fertilizer Program

a. Town Bylaw

In addition to the efforts to reduce nitrogen loading from stormwater, the Town of Orleans continues to implement BMPs to reduce the use of fertilizers and pesticides. The Pleasant Bay Alliance developed a fertilizer and pesticide use policy for municipal properties in April 2012. The Town developed a Fertilizer Nitrogen Control bylaw that passed at the 2014 Annual Town Meeting. The purpose of the bylaw is to restrict the use of nitrogen based fertilizers throughout Town and it includes the following provisions: no application of nitrogen between October 16 and April 14; no application before or during heavy rain; and no application within 100 feet of Resource Areas. In support of these efforts, the Orleans Pond Coalition maintained a robust public education campaign in Year 13 to inform residents and businesses about the proper use of and alternatives to fertilizers. Brochures regarding proper fertilizer and pesticide use are available at the Town Hall. Orleans is one of four Massachusetts towns (Falmouth, Mashpee and Nantucket) to have such a bylaw.

b. Fertilizer use evaluation methodology

4. Information Relevant to Adaptive Management Plan

Because these programs are scheduled for completion at the end of 2016, and Technical Memoranda have not yet been submitted to the town, there is no new information on the nutrient -removal attributed to stormwater BMPs or fertilizer reduction available at this time.